REMARKS

Applicants respectfully request reconsideration of this application, and reconsideration of the Office Action dated October 8, 2003 (Paper No. 6). Upon entry of this Amendment, claims 1-20 remain pending in this application. The changes to claims 1 and 5 are supported by the specification and drawings. No new matter is incorporated by this Amendment.

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The drawings are objected to because Figs. 3-6 should be designated by a Prior Art legend. The Office Action requires correction of the drawings.

In response, Applicants submit herewith a Formal Drawing Transmittal Letter and a sheet of the correct formal drawings showing each of Figs. 3-6 having the legend -- Prior Art --. Entry of the formal drawings is respectfully requested.

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Claim 5 is objected to because of an informality. Specifically, the Office asserts the phrase "the detection light reflecting gratings are provided on the substrate" should be changed to "the detection light reflecting gratings are provided on the optical fibers." Applicants respectfully traverse.

As explained in the specification and in claim 5, "a plurality of independent optical fibers" are provided on the substrate. In other words, claim 5 describes an optical communication device in which a plurality of independent optical fibers are provided on a substrate. The independent optical fibers have the detection light reflecting gratings therein. An example of such an arrangement is shown in Figures 8 and 9. Accordingly, Applicants have amended claim 5 to recite "a plurality of independent optical fibers having the detection light reflecting gratings is provided on the substrate."

The above remarks overcome this objection. Reconsideration and withdrawal of this objection are thus respectfully requested.

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Claims 1, 3, 4, 6, and 10-12 are rejected under 35 U.S.C. § 103(a) as purportedly obvious based on Minami et al. (U.S. Pat. No. 6,310,702) in view of Komatsu et al. (U.S. Pat. No. 6,192,170). Applicants respectfully traverse this rejection.

The present invention, detects disorders in optical communication systems. For example, the present invention detect breaks of a light guide in an optical communications system connecting a central station with a plurality of subscribers (ONUs: optical network units). According to the present invention, detection light of a wavelength (for example 1.6 μm) different from signal light is sent through the light guide. When the detection light sent from the central station is selectively reflected by a grating on the ONU, and returns from the ONU to the central station, it is confirmed that there is no problem in the fiber system between the station and the ONU. Alternatively, where the detection light does not return to the central station, this indicates a break in the light guide (fiber) somewhere in the system.

The Office Action asserts that Fig. 7 of Minami shows the features of claim 1 except "a substrate which the light guide provided on and the optoelectric device chip mounted on the substrate and the detection light filter is a detection light grating." The Office Action also asserts that if Minami, whose light guide is not formed on a substrate and whose filter is not a grating, is combined with Komatsu, the combination would be similar to the present invention. However, Applicants respectfully submit that this assertion is incorrect.

Initially, Applicants discuss Minami, and in particular, refer to Fig. 7 thereof. The lengths of light guides to filters 41-48 are different, respectively, and test light is reflected

by the filters 41-48. Accordingly, the device shown in Figure 7 of Minami detects trouble by measuring the test light intensity with time differences as shown in Fig. 8. While Minami's Fig. 7 has many branches and detects problems, the claimed invention detects faults in any given single line between the station and an ONU in the system. Each of the ONUs is connected exclusively to the station at a given time. In contrast to Minami, the present invention does not employ many branches and lines (light guides) or a time difference for detecting faults. In addition, Minami's filter is a dielectric filter and is highly expensive. Moreover, the filters 41-48 in Fig. 7 are provided outside the ONU modules in Minami. In contrast, in the present invention, fiber gratings are integrally provided in an ONU device. Accordingly, for at least the reasons described above, the present invention is quite different from Minami.

With respect to claim 1, the Office Action concedes that Minami does not disclose a detection light reflecting grating. However, the Office Action asserts that Komatsu describes the grating described in claim 1. The Office Action asserts that the detection light reflecting filter described by Komatsu is a detection light reflecting grating. However, Applicants respectfully submit that this in incorrect.

In Komatsu, the light guides and optoelectronic device chips are provided on a substrate. In Fig. 1 of Komatsu, four diffraction gratings 104 are disposed in optical waveguides 103, respectively. Fig. 1 of Komatsu shows that the oscillation wavelengths of laser diodes 102 should be exactly determined by the accuracy of the gratings 104. Applicants note that col. 1 , lines 60-64 of Komatsu states, "However, the conventional multiple-wavelength semiconductor laser has been problematic in that since the oscillation wavelengths of the multiple-wavelength semiconductor laser are determined by the fabrication accuracy of the diffraction gratings." Thus, Komatsu aims to solve this problem and control the accuracy of the gratings by changing the ambient temperature of

the gratings with heaters. In Komatsu, the gratings serve as resonators for LDs. This is described at col. 1, line 35-37, "...four diffraction gratings 104...serving as external cavities for SS-LDs 102."

Thus, to those of ordinary skill in the art, Komatsu teaches that the grating and laser diode form a resonator as a whole. The external cavities show a device for resonating light between a back end surface of a laser diode and the grating. One laser diode emits a wide spectrum of light, but the grating 104 selects one wavelength in the spectrum. There are four such LDs emitting light of a similar wavelength spectrum. In other words, the four lasers are substantially identical. Applicants submit that the front ends are not mirrors and that the gratings used as resonators in Komatsu have wavelength-selectivity for laser light. Accordingly, the gratings of Komatsu serve only as resonators for setting a wavelength of the laser, and are utilized for reflecting a wavelength of the laser. Furthermore, Komatsu's gratings are parts of the lasers and thus only reflect signal light. In contrast, the claimed invention calls for a grating for reflecting detection light (of a wavelength different from signal light) while leading the signal light. Komatsu, disclosing a grating as part of a resonator, can not be said to teach or suggest Applicants' claimed device including Applicants' recited "detection light reflecting grating".

Hence, although it is asserted in the Office Action that the detection light reflecting filter is a detection light reflecting grating (see col. 1, lines 30-59), Komatsu simply does not disclose a detection light reflecting grating as claimed. The grating disclosed by Komatsu is an external resonator for a laser diode. The grating of Komatsu does not reflect only detection light from among a plurality of kinds of light beams. Thus, even if Komatsu, having such gratings, properly were combinable with Minami,

such combination would still not have rendered Applicants' claimed invention obvious to one of ordinary skill.

Applicants now offer comment on several of the dependent claims. They first turn to claim 3. With respect to claim 3, the Office Action states, "Komatsu further teaches the substrate is a silicon substrate, the light guide is a SiO_2 type light waveguide produced upon the silicon substrate and the detection light reflecting grating is formed upon the SiO_2 type light waveguide (see col. 1, lines 18-58)."

As explained above, Komatsu neither teaches nor fairly suggests a detecting light reflecting grating as presently claimed. At col. 1, lines 18-58 in Komatsu, four diffraction gratings 104 are used as resonators for LDs. However, the gratings are not used for reflecting detection light selectively. In other words, because Komatsu is not a two-way communications device but a light source in which one laser diode emits light having one wavelength, the detection light simply is not used in Komatsu. The purpose of the present invention is different from that of Komatsu. The purpose of the present invention is to detect faults in fiber networks by transmitting detection light. In contrast, the purpose of Komatsu is to control the oscillation frequency of semiconductor laser devices by changing the ambient temperature of the grating by a heater.

With respect to claim 4, the Office Action asserts that it is well known in the art that: 1) a substrate can include a plastic substrate made of a polymer or a silicon substrate or both; 2) the light guide can include a plastic light waveguide produced upon the plastic substrate or a SiO_2 type light waveguide produced upon the silicon substrate; and 3) the detection light reflecting grating can be formed upon the plastic light waveguide or the SiO_2 type light waveguide.

To the contrary, however, the polymers used in the present invention are extremely specialized to satisfy severe temperature characteristics as follows,

1) to secure desired optical properties within an operating temperature range,

2) to ensure that physical optical properties are unchanged even when added with a heat history of mounting, and

3) to pass a reliability test (preservation at a high temperature or heat cycle test) essential for devices.

With respect to claims 6 and 11, the Office Action asserts that Komatsu suggests a plurality of independent light waveguides with the detection light reflecting grating. Applicants submit that for reasons similar to those described above, this assertion is incorrect. Komatsu does not use a detection light reflecting grating. The grating of Komatsu is not a detection light reflecting grating. As explained above, the grating of Komatsu is not a detection light reflecting grating with selectivity, but rather a resonating member for lasers.

Claims 10 and 12 also depend from claim 1. Thus, for at least the reasons described above, the combination of Minami and Komatsu fails to teach or fairly suggest each and every feature of the claimed invention.

The above remarks overcome this rejection. Hence, reconsideration and withdrawal of the rejection are respectfully requested.

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Claims 2 and 17-19 are rejected under 35 U.S.C. § 103(a) as purportedly obvious based on Minami et al. in view of Komatsu et al., and further in view of Higashi (U.S. Pat. No. 5,937,120).

Claims 5 and 7-9 are rejected under 35 U.S.C. § 103(a) as purportedly obvious based on Minami et al. in view of Komatsu et al., and further in view of Kato et al. (U.S. Pat. No. 5,859,945).

Claims 13-16 are rejected under 35 U.S.C. § 103(a) as purportedly obvious based on Minami et al. in view of Komatsu et al., and further in view of Tsuchiya et al. (U.S. Pat. No. 5,319,482).

Claim 20 is rejected under 35 U.S.C. § 103(a) as purportedly obvious based on Minami et al. in view of Komatsu et al., in view of Higashi, and further in view of Tsuchiya.

These four rejections are addressed together as similar issues apply to all four. Applicants respectfully traverse all four rejections.

The deficiencies of Minami and Komatsu are discussed above. None of the additional cited art remedies these deficiencies. For example, none of the asserted prior art of record teaches or fairly suggests the grating as defined by independent claim 1. Moreover, there is nothing in the asserted prior art which would have motivated those of ordinary skill in the art to have modified the grating described by Komatsu to arrive at the claimed invention. Hence, for at least this reason, none of the asserted prior art combination renders the claimed invention obvious.

Applicants also make the following remarks with respect to each of these four rejections. With respect to the rejection of claims 5 and 7-9, the Office Action asserts that Kato teaches a plurality of independent optical fibers with the detection light reflecting gratings (2a) (Fig. 1). However, Applicants submit that this assertion is incorrect. Kato's plurality of diffraction gratings 2a are not detection light reflecting gratings. The diffraction gratings 2a of Kato, like those of Komatsu, are also resonators. Kato, at col. 4, lines 35-41, states, "In the light emitting element module thus configured, the diffraction gratings 2a formed in the optical fibers 2 serve as external resonators for the light emitting elements 1. Therefore, the diffraction wavelength in each diffraction grating is set properly so that the oscillation wavelength of laser light emitted for each optical fiber 2

can be set as desired." Accordingly, it is clear that the diffraction gratings 2a serve as external resonators. Thus, if Kato is combined with Minami and Komatsu, present claims 5 and 7-9 would not have been made obvious to one of ordinary skill because none of the cited art describes a detection light reflecting grating.

With respect to the rejection of claims 13-16, the Office Action states that Tsuchiya teaches Y-branched light waveguides. However, unlike the present invention, Tsuchiya does not use test light of 1.6 μm, different from signal light. Tsuchiya utilizes 1.3 and 1.55 μm light beams, while the present invention uses 1.3, 1.55 and 1.6 μm light beams. Furthermore, Tsuchiya does not disclose the claimed grating for detecting faults in an optical fiber.

With respect to the rejection of claim 20, Applicants point out that claim 20 is dependent on claim 1. Moreover, the optical communication device claimed in claim 20 includes a substrate, an optical fiber, an LD, a WDM filter, and a detection light reflecting grating formed in the optical fiber. See Fig. 13 in the present specification. Claim 20, being dependent from claim 1, also includes the detection light reflecting grating described in claim 1. As explained before, none of the alleged prior art teaches or fairly suggests a detection light reflecting grating. Briefly, the filters 41-48 of Minami are not gratings, the gratings of Komatsu are resonators, the grating of Higashi is also a resonator, and Tsuchiya has no grating. Thus, claim 20 is not rendered obvious.

The above remarks overcome each of the four rejections. Accordingly, reconsideration and withdrawal of all four are respectfully requested.

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Applicants respectfully submit that this Amendment and the above remarks obviate the outstanding objection and rejections in this case, thereby placing the

application in condition for immediate allowance. Allowance of this application is earnestly solicited.

If any fees under 37 C.F.R. §§1.16 or 1.17 are due in connection with this filing, please charge the fees to Deposit Account No. 02-4300; Order No. 033035.059.

If an extension of time under 37 C.F.R. § 1.136 is necessary that is not accounted for in the papers filed herewith, such an extension is requested. The extension fee should be charged to Deposit Account No. 02-4300; Order No. 033035.059.

Respectfully submitted,

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